Analysis of Non-Cash Payment System on Economic Growth and Financial System Stability in Indonesia

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ABSTRAK

Penelitian ini bertujuan menganalisis pengaruh sistem pembayaran nontunai terhadap pertumbuhan ekonomi dan stabilitas sistem keuangan di Indonesia. Sistem pembayaran nontunai yang dimaksud meliputi e-money, kartu debit, kartu kredit, Sistem Kliring Nasional Bank Indonesia (SKNBI), dan real-time gross settlement (RTGS). Metode yang digunakan adalah model persamaan simultan dengan pendekatan two-stage least squares (TSLS) menggunakan data time series dari 2013 hingga 2023. Hasil penelitian menun-jukkan variabel e-money dan SKNBI berpengaruh positif terhadap pertumbuhan ekonomi, sedangkan RTGS dan suku bunga berpengaruh negatif signifikan. Sementara itu, kartu debit dan kartu kredit memiliki pengaruh signifikan terhadap suku bunga, dengan kartu debit berpengaruh positif dan kartu kredit ber-pengaruh negatif. Selain itu, pertumbuhan ekonomi juga berpengaruh signifikan dalam menurunkan tingkat suku bunga. Temuan ini menegaskan sistem pembayaran non tunai dapat meningkatkan efisiensi transaksi, mempercepat perputaran uang, serta mendukung kebijakan moneter melalui pengaruhnya terhadap suku bunga. Karena itu, penguatan sistem pembayaran digital perlu terus dilakukan untuk mendorong per-tumbuhan ekonomi yang berkelanjutan dan menjaga stabilitas sistem keuangan nasional.

Keyword: Sistem Pembayaran Nontunai; Pertumbuhan Ekonomi; Suku Bunga; Stabilitas Keuangan

ABSTRACT

This study aims to analyze the impact of non-cash payment systems on economic growth and financial system stability in Indonesia. The non-cash payment instruments examined include e-money, debit cards, credit cards, the Bank Indonesia National Clearing System (BINCS), and real-time gross settlement (RTGS). The method used is a simultaneous equation model with the two-stage least squares (TSLS) approach, utilizing time-series data from 2013 to 2023. The results show that e-money and BINCS have a positive influence on economic growth, while RTGS and interest rates have a significant negative effect. Meanwhile, debit cards and credit cards significantly affect interest rates, with debit cards having a positive effect and credit cards a negative one. Furthermore, economic growth significantly contributes to lowering interest rates. These findings highlight that non-cash payment systems can enhance transaction efficiency, accelerate money circulation, and support monetary policy through their influence on interest rates. Therefore, strengthening digital payment systems is essential for promoting sustainable economic growth and maintaining national financial system stability.

Keyword: Cashless Payment System; Economic Growth; Financial Stability; Interest Rate

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1. INTRODUCTION

Entering the 21st century, the field of information and technology has experienced rapid growth, significantly changing the financial industry. Technological advancements revolutionized the way individuals transact, leading to cashless (Sihotang & Nasution, 2025). Over time, cashless payment systems evolved from

paper-based ones such as checks and giro slips to card-based ones such as debit, credit, and e-money cards. Now, sophisticated network and application-based ones are emerging, including i-banking, m-banking, and fintech (Ramadanti & Kistanti, 2024).

As an emerging market country, Indonesia has proven its ability to innovate in digital payment systems (Rangkuty, 2021). To ensure the smooth and safe operation of the payment system, Bank Indonesia introduced policies that focus on four aspects: enhancing security, improving efficiency, expanding access, and prioritizing consumer protection. Cashless transactions are recognized as a more effective payment method and a driver of economic growth (Reviane, 2024). According to Bank Indonesia, the value of e-money transactions jumped to IDR 31.66 trillion between January and September 2018, doubling the total for 2017 (Ningsih et al., 2024).

The use of cashless payments also makes it easier for governments and central banks to manage economic policies, such as setting interest rates and monitoring money circulation. Since all transactions are digitally recorded, the data collected is more accurate and can be used to make better economic decisions (Nursari et al., 2019). However, this development also has challenges. Digital systems must be supported by a good internet network and strong security to prevent fraud or data leakage. Therefore, it is important to examine whether the cashless payment system can really encourage economic growth and maintain the stability of the financial system in Indonesia (Mellani & Putri, 2024).

"Economic growth" refers to the progress or development of a country's economy, which is usually measured by an increase in its gross national product (GNP). This concept is particularly significant for developing countries like Indonesia, where economic growth is the main focus (Efendi, 2019). A country is classified as developing when it experiences an expansion in the production of goods and services, which is reflected in an increase in GNP. Furthermore, economic growth should also show improvements in per capita output. An increase in per capita signifies higher reel wages and an improvement in living standards (Falah, 2023).

Monetary policy acts as a tool to ensure economic stability in Indonesia which will also affect the stability of the financial system (Rangkuty et al., 2022). In this context, monetary policy implemented by Bank Indonesia aims to achieve a balance between economic growth and price stability; interest rate adjustments become the main tool to regulate liquidity in the market and prevent financial crises that can harm the wider community. This suggests that the relationship between interest rates and financial system stability is complex and interrelated (Warjiyo, 2006).

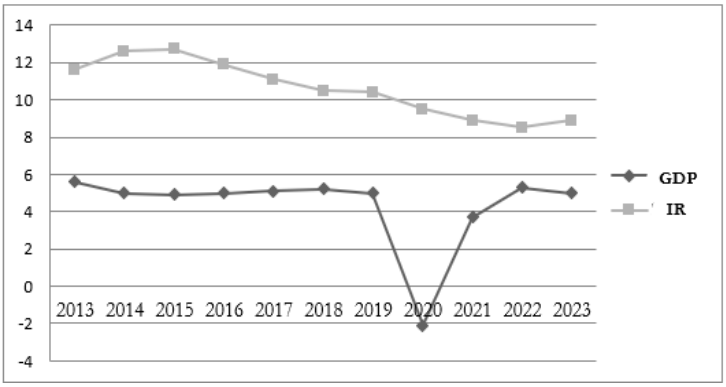

Figure 1. Economic Growth and Interest Rates in Indonesia, 2013-2023

It is known that the highest economic growth in 2013 was 5.6%. The cause was the condition of a stable inflation rate and a strengthening rupiah exchange rate in that government, while the lowest economic growth condition in 2020 was -2.1%. Global economic conditions experienced a downturn due to the covid-19 pandemic virus which affected Indonesia, but in 2021 economic growth conditions in Indonesia experienced very good growth from the previous year, which amounted to 3.7%, and closed at the end of the year from 2013 to 2023. Economic growth conditions in Indonesia in 2023 at 5.0% are in a stable position.

Furthermore, the interest rate data from 2013 to 2023 appears to fluctuate. In 2015, the interest rate increase was 12.7%, which means that in that year higher credit growth could be suppressed, as well as making loans more expensive for customers. In 2022 the interest rate decreased to 8.5%. This decrease was made to support post-pandemic economic recovery and overcome relatively low inflation. And, at the end of 2023, the interest rate closed at 8.9%. This decision was taken to maintain the stability of the rupiah exchange rate and ensure inflation remained under control.

In Indonesia, history shows that changes in interest rates are often used as an instrument to control inflation and maintain economic stability, therefore, a deep understanding of the interaction between interest rates and financial system stability is needed to create effective policies to support sustainable economic growth (Purba et al., 2023). Therefore, this study will try to answer the question of how the impact of non-cash payment

systems on economic growth and financial system stability in Indonesia, with the hope that this research will be able to make a significant academic contribution.

2. LITERATURE REVIEW

A. Technology Acceptance Model (TAM)

The technology acceptance model (TAM), which Davis introduced in 1989 as an extension of the theory of reasoned action (TRA), aims to predict the acceptance or utilization of information systems by users and the benefits for a job (Hatta, 2011). The use of an information technology in TAM is influenced by the desire to behave (Venkatesh & Davis, 1996).

B. Payment System

(Pohan, 2012) defines a payment system as a framework consisting of rules, institutions, and mechanisms that facilitate the transfer of funds to fulfill economic obligations. These systems are categorized into two main types: cash payment systems, which rely on physical currencies such as banknotes and coins (Atmaja & Paulus, 2022), and non-cash payment systems, which use various instruments including credit cards, debit cards, checks, giro forms, debit notes, e-money (digital wallets), QR code payments, bank transfers (via internet and mobile banking), and cryptocurrencies (Rositasari, 2021).

C. Electronic Money

E-money is a payment instrument that fulfills the element of being issued on the basis of the value of money deposited and issued by the issuer, which stores the value electronically on a server or chip. It is important to note that these electronic currencies are not classified as bank deposits under banking regulations (Zahro & Rahayu, 2021). E-money functions similarly to cash and can be used for a variety of transactions, including tolls, parking, transportation, and retail purchases. However, e-money cannot be converted back into physical cash (Hendarsyah, 2016).

D. Bank Indonesia National Clearing System

The Bank Indonesia National Clearing System (BINCSI) is an infrastructure that simplifies scheduled fund transfers and settles transactions by processing electronic financial data (EFS) across the country (Swandi & Barusman, 2022). The system includes debit and credit clearing: debit clearing still uses physical instruments such as checks and bilyet giro, while credit clearing operates entirely online, without paper documents (Swandi & Barusman, 2022). By providing automated and scheduled fund transfer services, SKNBI aims to improve the efficiency of retail payments, simplify interbank transactions and accelerate payment settlement. In addition, the system serves as an intermediary, ensuring smooth interbank payments under strict regulation and supervision to minimize the risk of clearing failure (Pangau, 2015).

E. Real-Time Gross Settlement (RTGS)

(Latumaerissa, 2012) explains the BI-RTGS system functions as a real-time gross settlement process for payment transactions, allowing accounts to be debited several times a day based on payment orders and receipts. Since its launch in 2000, Bank Indonesia has operated the BI-RTGS system as a means of interbank electronic funds transfer in rupiah, ensuring immediate settlement for each transaction (Hayati & Kijai, 2019).

F. Economic Growth

Todaro and Smith (2008) define GDP as a comprehensive measure of the final output of goods and services produced within the boundaries of a country, regardless of whether that output is produced by its citizens or foreign firms. This measure does not take into account whether the output is destined for domestic use or export.

In light of Indonesia's continued economic growth amid global challenges, the Managing Director of the International Monetary Fund (IMF) praised Indonesia for successfully implementing fiscal and monetary policies effectively. Indonesia's economic growth has been widely praised by various countries and international institutions on several occasions for its significant achievements.

G. Interest Rate

Interest rates reflect the compensation that investors receive for the use of their funds, derived from the calculation of economic value over a period of time. Interest rates play an important role in regulating a country's economy and are set by the government to ensure economic stability. Interest rates are important to take into account because the average investor always expects a greater return on investment (Siwi et al., 2019). In addition, interest rates affect the supply of money, increase the attractiveness of saving, and serve as a monetary policy tool to balance the supply and demand for money in the economy (Zulkarnain & Siregar, 2022).

3. RESEARCH METHOD

In many cases, economic variables not only have a unidirectional relationship, but also influence each other. So, this study uses a simultaneous equation model whose variable relationships are bidirectional

(Widarjono, 2014) with time series data from Bank Indonesia and World Bank from 2013 to 2023. Several assumption test steps are carried out, namely the data normality test, autocorrelation test, and identification test and then proceed to the Two-Stage Least Square (TSLS) model approach with the two equations as follows.

$$GDP = \alpha o + \alpha 1\ IR + \alpha 2\ EM + \alpha 3\ BINCS + \alpha 4\ RTGS + e1 \quad (1)$$

$$IR = \beta o + \beta 1\ GDP + \beta 2\ DC + \beta 3\ CC + e2 \quad (2)$$

Where:
GDP : Economic Growth
CC : Credit Card
IR : Interest Rate
EM : E-Money
BINCS : Bank Indonesia National Clearing System
RTGS : Real-Time Gross Settlement
DC : Debit Card
αo, βo : Constant
α1, α2, α3 : Coefficient
β1, β2, β3 : Coefficient
e1, e2 : Error Term

4. RESULTS AND DISCUSSION

Cashless payment systems allow transactions without the use of physical money, such as notes or coins. Instead, it relies on electronic or digital tools that facilitate the non-physical transfer of funds (Rositasari, 2021). According to (Febrinda & Ningsih, 2023), this system utilizes various tools, including debit cards, credit cards, checks, bilyet giro, e-money, bank transfers, and digital applications such as e-wallet and m-banking. Along with technological advancements and increasing internet access in Indonesia, cashless payment systems have become an essential part of modern transactions, improving efficiency, security, and convenience, eliminating dependence on physical cash (Damayanti et al., 2023).

(Kaur et al., 2020) highlighted several advantages of the cashless payment system, especially its efficiency compared to traditional cash payments. In addition, the system is transparent, reducing transaction errors through real-time validation by electronic systems. Moreover, cashless payments are generally more secure than cash payments, which carry physical cash (Hirnissa et al., 2021).

In recent years, cashless payments through digital and card methods have increased rapidly in Indonesia, especially after the Covid-19 pandemic. To minimize physical contact during the pandemic, many merchants have started implementing cashless payments. Currently, street vendors, convenience stores, and mosques accept cashless payments. A wide range of digital and card-based cashless payment options have contributed to the increasing popularity of cashless payments. This method not only simplifies the payment process, but also offers various benefits for users (Rositasari, 2021).

Cashless payment systems are crucial in driving Indonesia's economic growth by improving transaction efficiency, accelerating money circulation, and increasing tax revenue. However, the impact of this system can vary depending on the type of payment method used. Research by (Febriaty, 2019) shows that electronic money and credit card transactions significantly boost economic growth, while debit or ATM card transactions tend to have a negative impact. This highlights the potential for innovative cashless payment tools to increase efficiency and become an effective alternative to cash, thereby influencing economic development.

In addition, cashless payment systems strengthen financial system stability by improving efficiency, security, and risk management, while also expanding access to financial services. Nonetheless, strict supervision and regulation are essential to mitigate risks that could jeopardize national monetary and financial stability.

To conclude, cashless payment systems are critical to driving economic growth and ensuring financial system resilience. Expanding the use of cashless payments can result in greater transaction efficiency, increased productivity, and higher velocity of money circulation, while reducing risks and costs and improving transparency. To achieve sustainable economic growth and strong financial stability, it is imperative for the government and stakeholders in the financial industry to actively promote the use of cashless payment systems.

Table 1. Data Normality Test Results

Series : Residuals	
Sample 2013 2023	
Observations 11	
Mean	1.90e-15
Median	-0.031965
Maximum	1.743067
Minimum	-2.889090

Std. Dev	1.399818
Skewness	-0.479554
Kurtosis	2.746542
Jarque-Bera	0.451059
Probability	0.798094

Data normality shows the results of the Jarque-Bera test that the probability value of J-B> α = 10%, namely 0.451059> 0.10 so that the assumption of data normality is met and can be continued. Meanwhile, the autocorrelation test on each equation model shows the result of df is degrees of freedom for (approximate) chi-square distribution, the value of equation 1 is 0.1338 and equation 2 is 0.1014 > 0.10. Therefore, all indicators of changes in lags over time do not show any autocorrelation effect on the movement of the data, so the data shows the result of no autocorrelation problem.

Table 2. Autocorrelation Test Results

	Obs*R-square	**Prob.Chi-Square**
GDP	7,040377	0,1338
IR	7,744417	0,1014

Next, the identification test was conducted and showed the following results for each model equation.

Table 3. Identification Test Results

Equation	**K-k**	**m-1**	**Result**	**Identification**
GDP	5-2	4-1	3-3	*Exact Identification*
IR	5-2	3-1	3>2	*Over Identification*

Based on Table 3, the number of exogenous variables specified in the model is K. k is the number of exogenous variables specified in the equation. And m is the number of endogenous variables in the equation. So the explanation is exact-identification and over-identification in two equations with the Two-Stage Least Squares (TSLS) approach used.

Table 4. Summary of TSLS Estimation Results

Variable	**(1)**		**(2)**	
	Coef.	t-Stat	Coef.	t-Stat
Const.	16,55	3.771478 (0,0093)	5,71	1.925125 (0,0956)
DC	-	- -	0,06	4.901908 (0,0017)
CC	-	- -	-0,06	-3.960834 (0,0055)
EM	3,32	0.030521 (0,9766)	-	- -
BINCS	0,00	2.460498 (0,0491)	-	- -
RTGS	-0,00	-3.493702 (0,0129)	-	- -
GDP	-		-1,51	-4.585315 (0,0025)
IR	-0,89	-3.893853 (0,0080)	-	- -
R-squared	0,788057		0,799784	
Adj. R-squared	0,646762		0,713978	
F-statistic	5,577388 (0,032028)*		9.320774 (0.007681)*	

PDB = 16,55 + 3,32 EM + 0,00 BINCS – 0,00 RTGS – 0,89 IR + e1 (3)

SB = 5,71 – 0,06 CD + 0,06 CC – 1,51 GDP + e2 (4)

Equation (1) economic growth increases positively and significantly by 16.55% if e-money, BINCS, RTGS, and interest rates are zero. E-money shows an insignificant positive effect on economic growth of 3.32%, this means that e-money which increases by 1% does not have a significant effect on increasing economic growth by 3.32%. BINCS shows a significant positive effect on economic growth of 0.00%, this means that BINCS which increases by 1% significantly increases economic growth by 0.00%. RTGS shows a significant negative effect on economic growth of -0.00%, this means that RTGS which increases by 1% significantly reduces economic growth by -0.00%. Interest rates show a significant negative effect on economic growth of -0.89%, this means that interest rates that increase by 1% significantly reduce economic growth by -0.89%, cateris paribus.

Equation (2) interest rates increase positively but not significantly by 5.71% if debit cards, credit cards, and economic growth are zero. Debit cards show a significant positive effect on interest rates of 0.06%, this means that debit cards that increase by 1% significantly increase interest rates by 0.06%. Credit cards show a significant negative effect on interest rates of -0.06%, this means that credit cards that increase by 1% significantly reduce interest rates by -0.06%. Economic growth shows a significant negative effect on interest

rates of -1.51%, this means that economic growth that increases by 1% significantly reduces interest rates by -1.51%, cateris paribus.

Based on the estimation results, the R^2 value = 0.788057 in equation (1) means that e-money, BINCS, RTGS, and interest rates have an influence on economic growth by 78.80% and the remaining 21.20% is influenced by other variables outside the equation model. Meanwhile, the value of R^2 = 0.799784 in equation (2) means that debit cards, credit cards, and economic growth have an influence on interest rates by 79.97% and the remaining 20.03% is influenced by other variables outside the equation model. So the R^2 value in equation (2) is better than equation (1) in the research period.

E-money, BINCS, RTGS, and interest rates together significantly affect economic growth as indicated by the F-stat value of 5.577388 Prob. 0.032028. Debit cards, credit cards, and economic growth together significantly affect interest rates as indicated by an F-stat value of 9.320774 Prob. 0.07681.

Economic growth and interest rates are significant in influencing each other based on the results of this study. Indicators of non-cash payment systems, interest rates show significance to economic growth in the equation model, and economic growth shows significance to interest rates. So, in this case, the cashless payment system helps facilitate economic transactions, thereby accelerating the velocity of money in the economy, which in turn drives growth. Thus, the cashless payment system not only improves transaction efficiency and security, but also provides a stimulus for economic growth through increased consumption, investment, and lower interest rates that support economic activity.

Interest rates not only play a role in maintaining financial system stability, but also affect the use of non-cash payment instruments such as credit cards and debit cards. When interest rates rise, the interest on credit card bills also rises, so people tend to reduce the use of credit cards to avoid higher interest charges (Safitri & Ariza, 2021). Conversely, when interest rates are low, people are more encouraged to use credit cards because of the lower interest costs. Meanwhile, even though debit cards are interest-free, interest rates still affect people's purchasing power. Low interest rates can encourage increased consumption, which in turn increases the frequency of using debit cards in daily transactions (Sholihah, 2024).

Cashless payment systems play an important role in improving economic growth because they make the transaction process faster, easier and safer. By no longer relying on cash, people can make payments through e-money, debit cards, or digital applications. This accelerates the circulation of money in society and helps economic activities run more efficiently (Sinaga, 2021). Cashless payment systems make it easier for more people to access financial services, including those who previously did not have bank accounts. As more people are able to transact digitally, economic activity will also increase, and this will result in an increase in gross domestic product (GDP) (Demirguc-Kunt et al., 2018). The results of this study show that several non-cash payment instruments such as e-money and the clearing system have a positive influence on GDP.

In terms of financial system stability, cashless payments also provide benefits. With a more modern system, transactions can be recorded properly and are more easily monitored by financial institutions such as Bank Indonesia. This helps prevent financial crime and keeps the financial system safe and stable (Zhou, 2019). However, this system still needs to be supported by good technological infrastructure and strict supervision. Risks such as system disruption, data leakage, or digital fraud must be anticipated so as not to cause new problems. Therefore, all parties, including the government, banks, technology companies, and the public, need to work together so that the cashless payment system can be used safely and provide benefits for economic growth and financial stability of the country (Putra, 2009).

5. CONCLUSION

This research shows that economic growth and interest rates affect each other significantly. When interest rates rise, economic growth tends to decline. Conversely, when economic growth increases, interest rates can actually fall. In addition, non-cash payment systems such as e-money, debit cards, and credit cards also play an important role in supporting economic growth. These systems make transactions faster and easier, thus encouraging people's economic activity. Thus, the use of non-cash payments can help maintain economic growth and financial system stability in Indonesia.

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